7/30/91 LADWP ATM B&W

B&W Interface
Eric Wells
(John Cardy)

Swirlers- 12 wk lead time

Trial Test? mode 42 this Oct
min. 6 trial basis

Testing- Sec air flow analysis
must test (have available) all 48

Scheduling:
Aug 1 → Oct 15 evaluation

mid-Nov release for construction

March 23, 1991 - 4 weeks (1)

B&W Engineering - (No schedule)
Aug 5 Engineering Release

Infinite Element Analysis - Outer Register Assembly
[better way to attach front+back & support

B&W → Recommended to Test commercial risk assessment
warranty/guarante

Air Flow Monitoring
Controls - modes

7/31/91
LADWP

Project Management:
Peter Warders

Determine
What we want burners to do

BURNERS :

Air Flow Metering (+ Control)

electronic	?
~~pitot~~ tubes	1.2
air foils	1.8

GOALS Burner Design ~~Specs~~ Objectives

type up & distribute

1) Eliminate Overheating / Thermal Degradation

a) Improved burner materials (309 SS or 800H selection? 1350°F Design Point)
[Operating temps. 1150-1200]

b) improve burner cooling o/s & I/s to maintain all temps below 1350

c) improve component expansion ability so that no [damage] occurs at 1350 or below
material stays in elastic range

d) eliminate as many dissimilar welds as possible

e) minimize radiant heat into burner component

2) STOP Burner line fires (Burner Issues)

a) eliminate ~~staging~~ deposition in nozzles

b) insure that we have no recirculation of flame or flue gas into nozzle (either in or out of service)

3) Minimize eyebrow formation

a) Design (setup) burner aero dynamics to give correct flame shape to minimize eyebrow formation

b)

4) Eliminate slagging in inner & outer air sleeves

a) maintain positive pressure gradients across both registers

b) eliminate operation with stalled air flow

5) Improve combustion conditions (O_2/CO profiles)

1. average O_2 levels of 3.2% or less, with ranges (max to min) of less than 1.5% O_2 [full load 7 over configuration]
2. CO levels of ~~less~~ 150 ppm or less with ranges (max to min) of less than 75 ppm

6) Balance Sec Air Flow

a. Burner to burner secondary air flow balance of +/- 3%

b. Insure adequate air flows to each burner row ~~to burner row control~~ for ~~all~~ all operating conditions

7) Increase scanner / flame ~~stability~~ detection
   a) reliability accurately detect flame on all burners during all loads

8) Maintain or reduce NOx and LOI levels
   a) Maintain NOx levels at or below 0.44 #/mBtu (at full load 6.2 M#/hr steam flow)

   b) Maintain LOI ash levels less than 1.0 ? %
   (with 70% thru 200 mesh coal)

   full load

~~10~~ (7 3)	90	
14	6	80

9) Minimize routine maint requirements on burners
   a) reduce maintenance levels to industry standards (ie erosion rope packing etc)

10) Extend burner life
   a) no major replacement of burner components (registers, sleeves, etc) for ~~25~~ years

B&W'S PROPOSED BURNER DESIGN UPGRADE REVIEW MEETING

AGENDA

OUTSTANDING ISSUES

I. OVERHEATING

A. Objective- Extend life of burners and minimize routine maintenance requirements by eliminating the overheating and thermal expansion damage.

Concerns-

1. Material Considerations

2. Outer Air Assembly Rearplate Thermal Compensation and Restraint

3. Coal Nozzle Tip Overheating

4. Air Sleeve Casing Overheating

5. Casing Seal Arrangement

6. Modeling Confirmation- Finite Element Analysis

II. SECONDARY AIR FLOW

A. Objective- Establish cooling air flows across the burner fronts to eliminate overheating when the burners are not in service, yet ensure uniform air distribution while burners are in-service.

1. Two Position Outer Register Settings

2. Cooling Air Flow Requirements

3. Burner Front Temperature Requirements
   a. Thermocouple requirements?

B. Objective- Eliminate flue gas recirculation back into the burners which has been causing coal nozzle tip pluggage and slagging on the inner and outer air sleeves, plus fly ash accumulation in the windbox.

1. Resolve Flue Gas Recirculation back into the Burner (eliminate slagging and fly ash lick back)

2. Determine Velocity Profiles of the three air zones (primary, inner (spin) and outer air zones)

C. Objective- Balance secondary air flows from burner to burner

(across a burner level) without having to use the air registers to accomplish this (which are required for flame adjustments).

1. Balance Burner to Burner Air Flows
   a. Air Flow Modeling
   b. Testing

D. Objective- Balance secondary air flows on a row to row and on a front wall to back wall basis to achieve appropriate secondary air flow ratios.

1. Balance Individual Burner Rows
   a. Air Flow Modeling
   b. Balancing

2. Air Flow Monitoring and Control

III. BURNER LINE FIRES

A. Objective- Stop burner line fires by establishing air flow profiles which eliminate recirculation into the coal nozzles (in both in and out of service conditions).

1. 100% Cold Primary Air Flow Sweep on Start and Stop --

2. Eliminate Flue Gas Recircualtion into Nozzle

3. Eliminate Burner Line Fires

IV. BURNER SETUP

A. Objectives- Determine burner operating parameters.

1. Relative Air Flow Quantities (Inner to Outer to Primary Air)

2. Windbox Pressure Drops (I/S and O/S)

3. Register Positions
   a. Inner (spin) vane positions
   b. Backplate setting
   c. Outer Register Position

4. Cooling Air Flow Requirements

5. Burner Front Temperature

V. BURNER OPERATION AND PERFORMANCE

A. Objective- Maintain and/or improve combustion and operating parameters of the burners. These parameters include:

a. NOx emission levels (maintain at or below 0.44 lbs/MBtu)
b. O2 levels of 3.2% (design) or less with ranges (maximum to minimum) of less than 1.5% O2
c. CO levels of 150 ppm or less with ranges (maximum to minimum) of less than 75 ppm
d. LOI ash levels of less than 1.0% (with 70% thru 200 mesh coal)
e. secondary air flow balancing of +/- 3% from burner to burner
f. out of service cooling air flow requirements
g. burner front operating temperatures (I/S & O/S)
h. boiler efficiency levels

B. Objective- Improve maintenance and operating conditions on the burners. These parameters include:

a. minimize eyebrow formation
b. eliminate flue gas recirc (slagging and fly ash in burner)
c. improve scanner performance
d. extend burner life
e. minimize maintenance requirements

VI. BURNER TESTING

A. Objective- Test operating and performance conditions of the burners to determine acceptability of the modifictaions.

1. Test the fore mentioned parameters.

BURNER DESIGN EVALUATION OBJECTIVES

Due to IPSC's concerns with B&W's proposed burner design upgrade not addressing the heart of the burner deficiencies, IPSC is recommending an outside consultant to assist in the burner design review and providing third party support for air flow and finite element modeling.

The goal is to keep B&W's proposed burner design intact, as much as possible, to mitigate warranty and guarantee issues while attempting to resolve the outstanding burner issues.

OBJECTIVES The objectives of the IGS burner replacement/ upgrade evaluation include the following key issues:

- Extend life of burners and minimize routine maintenance requirements by eliminating the overheating and thermal expansion damage.
- Stop burner line fires by establishing air flow profiles which eliminate recirculation into the coal nozzles (in both in and out of service conditions).
- Balance secondary air flow across the burner fronts to ensure uniform distribution while burners are in-service and eliminate overheating when the burners are not in service.
- Eliminate slagging in coal nozzle, inner and outer air sleeve assemblies which may be contributing to burner line fires and air flow maldistribution.
- Minimize eyebrow formation above the burner which impacts lighter and scanner operation as well as coal combustion (O2 profiles).
- Maintain and/or improve combustion and operating parameters of the burners. These parameters include:
  a. NOx emission levels (maintain at or below 0.44 lbs/MBtu)
  b. O2 levels of 3.2% (design) or less with ranges (maximum to minimum) of less than 1.5% O2
  c. CO levels of 150 ppm or less with ranges (maximum to minimum) of less than 75 ppm
  d. LOI ash levels of less than 1.0% (with 70% thru 200 mesh coal)
  e. secondary air flow balancing of +/- 3% from burner to burner

Questions:

What Material? (selection)

What Design (flexibility, etc)

Switches U#1 ?
U#2 test?

flow materials

How to do row to row balancing

Qual ~~issues~~ ?

T/C location + #?

Air Flow Monitoring + Control

~~Fuel Flow balancing~~

Alternatives:

~~pilot test~~

Option 1 U2 installation swirlers
Balancing

extend life U2
test & verify swirler design

Option 2 B&W test 6 burners

Option 3 B&W test 6
4 swirlers